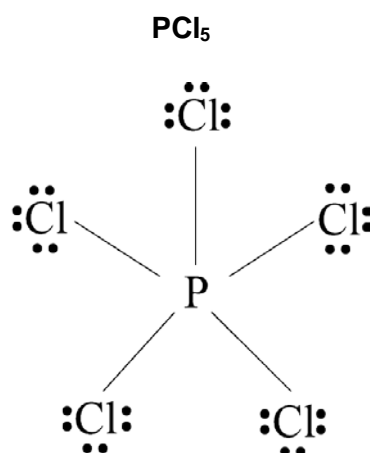
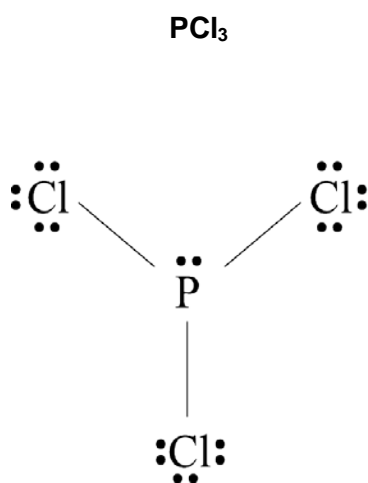


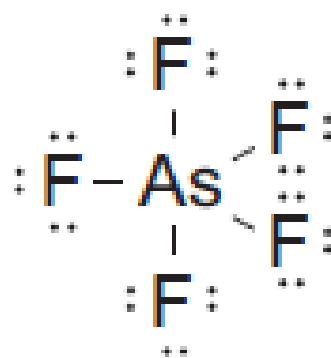
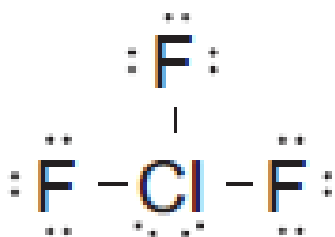
## Explaining shapes and polarity of molecules

Answer the following questions in as much detail as you can

1) The Lewis structures for the two molecules  $\text{PCl}_3$  and  $\text{PCl}_5$  are shown below. Compare and contrast the shapes and the polarities of these two molecules.



2) The Lewis diagrams for  $\text{ClF}_3$  and  $\text{AsF}_5$  are shown below. Compare and contrast the shape and polarity of these molecules.



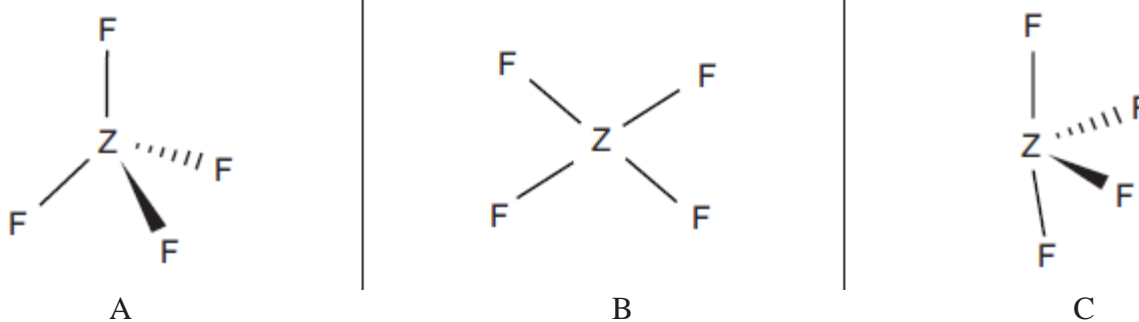
3) The Lewis diagrams for  $\text{IF}_5$  and  $\text{PCl}_5$  are shown below. Discuss the polarities of these molecules.



4) Discuss the fact that although both  $\text{SF}_4$  and  $\text{XeF}_4$  have four bonds around the central atom, the molecules have different shapes and polarities.

5) Compare the polarities of the two molecules,  $\text{BrF}_3$  and  $\text{SF}_6$ .

6) a) The drawings below are three possible shapes for a molecule  $\text{ZF}_4$ , where 'Z' represents the central element. 'Z' has lower electronegativity than F. Name the shapes represented by the three diagrams.



Explain why C is the only shape that can give rise to a polar molecule for  $\text{ZF}_4$ .

**b) i)** Draw the Lewis diagram for the ion  $\text{BrF}_4^-$

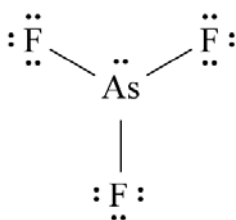
**ii)** Choose the structure for the  $\text{BrF}_4^-$  ion from those pictured in part (a), on the previous page. Give a reason for your answer.

**c)** Circle the element, from the following list, which would be the central element Z in a molecule  $\text{ZF}_4$  that has shape C (see part(a)). Be C Se Si Xe Justify your answer.

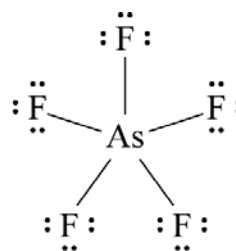
**7)** Discuss the polarities of  $\text{AsF}_3$  and  $\text{AsF}_5$  molecules. Your discussion should include:

- justification for the molecular shape and
- relative electronegativities of the atoms within the molecule.

The Lewis structures for each molecule are shown below.



Arsenic trifluoride,  $\text{AsF}_3$



Arsenic pentafluoride,  $\text{AsF}_5$

**8)** Discuss reasons for the difference in the polarities of  $\text{BF}_3$  and  $\text{PF}_3$  molecules.